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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/615,332	07/08/2003	Sven Lindfors	ASMMC.043AUS	8737

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EXAMINER

STOUFFER, KELLY M

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 08/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/615,332	LINDFORS, SVEN	
	Examiner	Art Unit	
	Kelly Stouffer	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 1-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8 December 2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 1-11 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 20 July 2006.

Applicant's election without traverse of claims 12-34 in the reply filed on 20 July 2006 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 12-14, 18-23, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent number 6126994 to Murakami et al. In claim 12, the applicant claims a method for providing a vapor phase reactant from a solid or liquid source that requires the source being fed from storage chamber into a vaporization chamber with higher temperature. The source is vaporized in the vaporization chamber, used in a vapor deposition process and the unused source is drained from the vaporization chamber without opening the vaporization chamber. Murakami et al. shows a method where a liquid material L is stored in reservoir 4 and travels into the evaporator 8 in Figure 1. The evaporator and evaporates the liquid material L that travels into the deposition chamber as described in column 2 lines 53-64. The evaporator is heated

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due to its proximity to heating means 68 and 70 in Figure 1 and in column 5 lines 57-67. Murakami et al. meets all the recitations of claim 12 at least as broadly recited by claim 12.

With regard to claim 13, the liquid materials used by Murakami et al. are described as precursors in column 1 lines 40-51. Murakami et al. meets all the recitations of claim 13 at least as broadly recited by claim 13.

Regarding claim 14, an unvaporized liquid is maintained in the vaporizer that maintains the vaporization process in column 5 lines 10-21 and shown in Figure 3. Murakami et al. meets all the recitations of claim 14 at least as broadly recited by claim 14.

Regarding claims 18 and 19, Murakami et al. shows a discharge passage 52 that collects unvaporized liquid from the evaporator 8 and is connected to reservoir 4 in Figure 1. Though Murakami et al. does not explicitly disclose the unvaporized liquid flowing from discharge passage 52 into reservoir 4, one of ordinary skill in the art would recognize that the only utility of connecting a discharge passage from the evaporator into the reservoir would be to drain unvaporized liquid back into the reservoir. The pump 62 in Figure 1 is used with discharge passage 52 when it becomes more difficult to remove the unvaporized liquid (column 5 lines 26-40). Murakami et al. meets all the recitations of claims 18-19 at least as broadly recited by claims 18-19.

Regarding claim 20, Murakami et al. describes a cold trap 60 in Figure 1 for removing liquid from the exhaust out of discharge passage 52 in column 5 lines 26-40.

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This can be considered a dedicated drain container for the unvaporized liquid, at least as broadly recited by the applicant in claim 20.

With regard to claim 21, Murakami et al. discloses an apparatus including reservoir that will stably supply the low-pressure liquid material for film deposition (this may be broadly interpreted to include supplying the liquid material stably with respect to temperature) in column 2 lines 28-33. The liquid material L is also said to be under normal temperature and normal pressure in column 3 lines 62-66. Murakami et al. meets all the recitations of claim 21 at least as broadly recited by claim 21.

With regard to claim 22, the vaporization chamber keeps the precursor below its boiling pressure as it does not vaporize the precursor by heat, but by an evaporation gas. (column 4 lines 60-67, column 5 lines 1-9) Murakami et al. meets all the recitations of claim 22 at least as broadly recited by claim 22.

With regard to claims 23 and 26, Murakami et al. describes heating means 68 that may be described as a hot zone with the reaction and vaporizer chambers included (at least as broadly described in claim 26) as shown in Figure 1. Heating means 68 includes heaters for the vapor feed passage from the vaporizer chamber to the reaction chamber (at a temperature sufficient) to prevent the evaporated gas from re-liquefying in column 5 lines 57-63.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. in view of US Patent number 5376409 to Kaloyeros et al.

Murakami et al. includes a liquid precursor to be vaporized in a vaporizer. Murakami et al. does not include a solid dissolved in a solvent as a precursor to be vaporized.

Kaloyeros et al. teaches the delivery of solid precursors in liquid solution to be vaporized in order to allow low vaporization temperatures of a solid an ease of transportation of the mixture of a precursor and solvent to a chemical vapor deposition reactor in column 3 lines 27-34.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Murakami et al. to include vaporizing a solid dissolved in a solvent as taught by Kaloyeros et al. in order to allow low vaporization temperatures of a solid an ease of transportation of the mixture of a precursor and solvent to a chemical vapor deposition reactor.

4. Claims 17, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. in view of Kaloyeros et al. as applied above, and further in view of

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US Patent number 6178925 to Sturm et al. Murakami et al. and Kaloyeros et al. are described above and include the provisions of claim 17 except for the solid remains of the unvaporized mixture being drained by adding solvent to the vaporization chamber. Sturm et al. teaches a solvent flush approach that flushes the residual solid from a left over in the vaporizer with a solvent in order to dissolve the residual solvent residue and remove it from the vaporizer. (Column 2 lines 28-37)

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Murakami et al. and Kaloyeros et al. to include a solvent flush approach as taught by Sturm et al. in order to dissolve the residual solvent residue and remove it from the vaporizer.

Regarding claims 31 and 32, Sturm et al. discloses the draining in the form of a solvent flush that is performed regularly between each coating cycle in column 2 lines 37-42 or at the end of the day, at the end of the week, or when the wafer is changed in the system in column 6 lines 30-38.

5. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. in view of US Patent number 5882416 to Van Buskirk et al. Murakami et al. is described above and includes all the provisions of claims 24 and 25 except a vaporization chamber maintained in a first hot zone, a reaction chamber maintained in a second hot zone where the two hot zones share some insulating elements. Van Buskirk et al. teaches heating systems for both the vaporization chamber and reaction chamber that may be one heating system or hot zone sharing

insulating elements or separate heating systems or hot zones to prevent condensation of the vapor on any other surfaces besides the substrate in column 10 lines 25-62.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Murakami et al. to include a vaporization chamber maintained in a first hot zone, a reaction chamber maintained in a second hot zone where the two hot zones share some insulating elements as taught by Van Buskirk et al. in order to prevent condensation of the vapor on any other surfaces besides the substrate.

6. Claims 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al in view of US Patent number 7063981 to Bondestram et al. Murakami et al. is described above and includes a vapor deposition process for the method previously described. Murakami et al. does not describe this method as an ALD method or supplying pulses of the vaporized precursor alternatingly with another vaporized precursor. Bondestram et al. teaches an ALD system with alternating pulses of two vaporized reactant sources in column 6 lines 17-43 to better control the growth mechanism of the film on the substrate in column 1 lines 21-48.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Murakami et al. to include the method as an ALD method or supplying pulses of the vaporized precursor alternatingly with another vaporized precursor as taught by Bondestram et al. in order to better control the growth mechanism of the film on the substrate.

With regard to claims 28 and 29, Bondestram et al. describes an ALD method with an inert gas purging in between pulses and a valve for controlling the flow of said

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gas out of a vaporization chamber in column 6 lines 17-43 and shown by valve 30 in Figure 1.

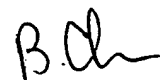
7. Claims 33 and 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. in view of US Patent number 6007330 to Gauthier. Murakami is described above and includes all the recitations of claims 33 and 34 except for a method to sense the level of unvaporized liquid in the vaporization chamber and automatically refill the unvaporized liquid. Gauthier teaches a method to sense the level of the unvaporized liquid and automatically refill the storage container and thereby refill the vaporization chamber to allow the system to run essentially continuously in column 5 lines 2-14.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Murakami et al. to include a method to sense the level of the unvaporized liquid and automatically refill the storage container and thereby refill the vaporization chamber as taught by Gauthier in order to allow the system to run essentially continuously.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nolet et al. and Klinedinst et al. show a similar procedure and corresponding apparatus.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly Stouffer whose telephone number is (571) 272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.



BRET CHEN
PRIMARY EXAMINER

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly Stouffer
Examiner
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kms